

23 SEP 1994

Ref: 94-F-0787

Mr. Jonathan Gordon
Department of Political Science
The University of North Carolina at Chapel Hill
CB# 3265, Hamilton Hall
Chapel Hill, NC 27599-3265

Dear Mr. Gordon:

This responds to your March 24, 1994, Freedom of Information Act (FOIA) request pertaining to Record Group 330, Accession Number 66-A3203, Department of Defense Research and Engineering (DDR&E) folders entitled, "Foreign Research and Development Capability - 1957," and "95.8 - Defense Science Board." Our April 4 interim response refers.

DDR&E provided the enclosed records as responsive to your request. Since chargeable processing costs were under \$15.00, there are no assessable fees, in this instance.

Sincerely,

SIGNED

W. M. McDonald
Director
Freedom of Information
and Security Review

Enclosures:
As stated

Prepared by Kahn:4F0787L1:9/23/94:DFOI:X71160:gr~~✓~~pk_y1_wh__

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#6416

FOREIGN RESEARCH & DEVELOPMENT CAPABILITY 1957 - 1960

94-F-0787



OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON 25, D. C.

14 October 1957

RESEARCH AND ENGINEERING

MEMORANDUM FOR DIRECTOR, OFFICE OF AERONAUTICS
DIRECTOR, OFFICE OF ATOMIC, BIOLOGICAL AND
CHEMICAL WARFARE
DIRECTOR, OFFICE OF ELECTRONICS
DIRECTOR, OFFICE OF FUELS, MATERIALS AND
ORDNANCE
DIRECTOR, OFFICE OF GUIDED MISSILES
DIRECTOR, OFFICE OF MAINTENANCE ENGINEERING
DIRECTOR, OFFICE OF SCIENCE

SUBJECT: Foreign Research and Development Capability

The Office of Foreign Programs is currently studying the possibility of specific agreements between the United States and one or more foreign countries for coordination of research and development in specific areas. Although some such arrangements already exist in certain areas, under various terms, with differing motivations and intents, there is no over-all plan for effecting such coordination.

In practice, the character of an R&D coordination agreement (as compared to an R&D execution agreement, a Defense pact, Military Assistance arrangement, etc.) would depend on many factors other than those scientific or technical. However, in order that the military research and development interests of the United States be adequately represented in our national plans for such agreements, it is appropriate that the ASD(R&E) be advised by his staff and consultants of notable areas of foreign scientific and technical competence.

Would you, therefore, with such guidance from your divisions as appropriate, prepare a list of outstanding areas of foreign scientific competence in the technical areas under your cognizance which may have come to your attention in official duties and professional experience. In the preparation of your recommendations, the following factors should be taken into consideration:

- a. The technical area designated should be sufficiently specific to span the competence of individual scientists and engineers rather than ad hoc groups (e.g., infrared detectors rather than electro-magnetic detection).

b. Priorities in competence among nations may be assigned if more than one is designated.

c. Operational or functional categorization of areas should be avoided as far as your knowledge permits (e.g., sonar rather than undersea surveillance).

d. Political and security considerations should not prevent inclusion of items in the list. Comment on these matters may be included if you desire. The primary purpose is identification of areas of scientific or technical competence. Recommendations as to possible negotiation on any other basis are not solicited at this time.

Your recommendations would be appreciated by 1 November. Mr. Arthur (Room 3E-1060) and I will be available to discuss this matter further if you so desire.

/s/ CHARLES S. WEAVER
Director
Office of Foreign Programs

cc: Mr. Voorhees
Gen. Larkin
Mr. Waggoner
Dr. Bennett, ISA

31 October 1957

MEMORANDUM FOR MR. JOHN GARRETT, CFMO

SUBJECT: Foreign Research and Development Capability

In reply to Mr. Townsend's memorandum on the above subject, dated 28 October 1957, the following information is submitted:

a. Technical areas of interest to the E&S Division in which particular foreign countries have a special competence are:

1. Precision Optical Devices - Holland (Old Delft)
2. Precision Instruments (Cameras, etc) - Switzerland
3. High Quality Optical Glass, Precision Lenses and Optical Instruments - Germany (Schott and Zeiss)
4. Camouflage Techniques - China
5. Fire Fighting Equipment - England
6. Clothing, Textiles and Footwear - England
7. Batteries - Germany
8. Thermal Batteries - Holland
9. Nickel Cadmium Batteries - France (Safte Co.)
10. Water Demineralization - France, Holland, England, Sweden

b. For a more thorough survey of this subject, I suggest that the technical men directing the R&D efforts in the separate military departments be contacted. E&S Division staff will be glad to do this for our area of interest, if desired.

G. B. WARRENHAM
Chief, Equipment and Supplies Div.

GBW/mrb/E&S Div.
3-D-1077 X55531



OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON 25, D. C.

RESEARCH AND ENGINEERING

28 October 1957

MEMORANDUM FOR MR. WAREHAM
MR. BROOKS
MR. GARRETT
MR. BIRD
MR. BELYEA

SUBJECT: Foreign Research and Development Capability

Attached is a memorandum from Mr. Weaver asking each office for recommendations as to technical areas in which particular foreign countries have special competence. In order to make a preliminary answer to this memorandum, it is requested that each of you furnish your off-hand comments with respect to:

- (a) Technical areas in which, from your own knowledge, particular foreign countries have a special competence.
- (b) Suggestions for means of making a more thorough survey, should this be desired. This information should be transmitted to Mr. Garrett by 1 November.

J. R. Townsend
Special Assistant

Attachment: Memo from Office of Foreign Programs dated 14 Oct. 1957.

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95.8 838 - June 22

94-F-0787

4 February 1957

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MINUTES

Second Meeting of the
DEFENSE SCIENCE BOARD
13 December 1956
The Pentagon
Washington, D. C.

Members Present:(a) Chairman, or designated alternate, of Army-Navy-Air Force Senior Advisory Committees:

Dr. Frederick L. Hovde, Chairman, Army Scientific Advisory Panel
and Chairman pro tem, 2nd Meeting, Defense Science Board
Dr. E. R. Piore* for Dr. J. A. Stratton, Chairman, Naval Research
Advisory Committee
Dr. James H. Doolittle, Chairman, Air Force Scientific Advisory
Board

(b) Chairmen of OASD(R&D) Technical Advisory Panels:

Mr. Harry A. Winne	-	Atomic Energy
Dr. R. W. Cairns	-	General Sciences
Dr. Zay Jeffries	-	Materials
Dr. L. T. E. Thompson	-	Ordnance
Dr. Wilbur Schramm	-	Research in Special Operations
Dr. E. W. Engstrom**	-	Electronics
Dr. Paul M. Fitts**	-	Personnel & Training
Dr. Richard A. Kern	-	Medical Sciences

(c) Representatives of Other Agencies:

Dr. Detlev W. Bronk, President, National Academy of Sciences
Dr. Allen V. Astin, Director, National Bureau of Standards
Dr. Alan T. Waterman, Director, National Science Foundation
Dr. Hugh L. Dryden, Director, National Advisory Committee for
Aeronautics

Others Present:Office of the Assistant Secretary of Defense (R&D):

Dr. C. C. Furnas, Assistant Secretary of Defense (R&D)
Mr. William M. Holaday, Deputy Assistant Secretary of Defense (R&D)
Mr. George D. Lukes, Executive Secretary, Defense Science Board

This document contains information affecting the national defense of the
United States within the meaning of the Espionage Laws, Title 18, U.S.C.,
Sections 793 and 794. The transmission or the revelation of its contents
in any manner to an unauthorized person is prohibited by law.

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Present by Invitation:(a) For Items 1 through 7:

OASD(R&D) Division Directors, Directors of Technical Offices,
Senior Military Staff Officers, Committee and Panel Secretaries,
and Secretary, R&D Policy Council.

(b) For Item 5:

Mr. Samuel E. Clements, Director, Planning Division, OASD(R&D)

(c) For Item 6:

Lt. Gen. S. E. Anderson, USAF, Director, Weapons Systems Evaluation
Group

Dr. Albert G. Hill, Director of Research, Weapons Systems Evaluation
Group

Mr. Bert F. Brown, Weapons Systems Evaluation Group

*Present for discussion of Item 4 and subsequent items.

**Departed after Item 9.

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ITEM 1 - Minutes of the First Meeting (CONFIDENTIAL)

The Executive Secretary proposed corrections (TAB A, DSB 3/1 Addendum), that had come to his attention, to the minutes (DSB 3/1) of the First Meeting.

There being no further corrections, the Board approved unanimously the corrections proposed.

ITEM 2 - The Needs and Opportunities for Background Research and Development (CONFIDENTIAL)Presentation:

Dr. Furnas referred to salient portions of his notes on the FY 1958 R&D budget (RD 106.8/5, secret, ITEM 2, TAB A, DSB 2/2), pointing out that in times of intense international stress, the tendency is to over-estimate the crisis and neglect the needs of future weapons technology. He expressed the hope that the Board could adequately argue the case of the future and assist in the attainment of a balanced research and development program meeting the critical immediate needs and the problems of the future.

With such a philosophy in mind it would follow that where duplicative development exists, we should have the courage to exercise selectivity and invest the "savings" in programs that look to the more distant future.

Dr. Furnas outlined further the financial environment of the research and development program; to wit, that the number of dollars of constant value available for defense research and development have been decreasing steadily since 1953. The accompanying chart--"Department of Defense Funds Available for R&D"--with explanatory material (TAB B) graphically portrays this trend. The net effect is that we are today spending less on defense research and development, in terms of the purchasing power of today's dollars, than we did in 1951, in spite of the greatly increased complexity of the developing weapons technology.

Discussion:

Discussion gravitated towards a questioning attitude as to the effectiveness of research and development in providing combatworthy weapons. It was pointed out that not only is the weapon involved, but also the carrier of the weapon. In an era where the speed of the carrier is undergoing a rapid change, it would appear that more effective progress would be attained through profound attention to the over-all system. Piece-meal approach along discrete technological lines leads to strains between the potential of the carrier, the search and detection device, and the lethal power of the destructive device.

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Ingenuity in the technical sense is not realized if our weapons systems do not prove combatworthy. Some experiences in World Wars I and II were cited as illustrative of this point.

Discussion closed on the note that there is a real need to test our weapons systems to demonstrate and evaluate their points of weakness rather than their points of strength, the consequences of which will be better direction of and more attention to the needs of the research and development program; indeed, perhaps leading to some highly unconventional approaches to warfare.

ITEM 3 - The Materials Program of the Department of Defense (UNCLASSIFIED)

Presentation:

Dr. Jeffries outlined the nature of the assignment undertaken by the Materials Advisory Board (MAB) of the National Research Council in October 1955 at the request of OASD(R&D) (see ITEM 3, TAB B, DSB 2/2). Both the technical content and the administrative organization of the materials program were cited as warranting major attention in the MAB review, the end objective being to establish an adequate and efficient program which would provide maximum support to both short range and long range weapons development programs.

The MAB organized a special committee and fifteen technical panels for this purpose. While the final MAB report is planned for completion during the first quarter of 1957, each technical panel had, as of the date of Dr. Jeffries' presentation, completed a preliminary report on its findings. Some of the highlights are the following:

- a. The materials program in the main is reasonably adequate and satisfactorily selective, the one exception being the support of basic research.
- b. Military needs are such that there are continuing pressing demands for a higher level performance of materials. These demands forge a need for more research, particularly in the exploratory and basic research portion of the spectrum. Further, the pressure for new knowledge appears to be unrelentless: technological advances make the materials requirements more stringent; the number of devices that need improvement continues to increase; and the number of new devices that are needed continues to increase.
- c. While the situation of materials supply was not good in 1951 (eight metals were cited on the highly critical list), the situation is now greatly improved. Nickel is fairly free and aluminum and magnesium are available. The most critical metal now is selenium. This represents very great progress since 1951.
- d. Progress can be substantially advanced through Defense sponsorship of symposia in the materials field on a timely basis. The rubber and plastics symposium serves as a good example of the engagement of specialists to make contributions to the military program.

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e. Department of Defense activities establish such unique and demanding requirements that Defense leadership in supporting research in the materials field is essential. A few years ago the nickel program was a crash (as opposed to a conventional) endeavor. The same characterization applies to the titanium program, although in this case a momentum has developed which may now carry the program forward at an acceptable pace. There appears to be no doubt for the need for crash developments on missiles materials. These circumstances arise mainly from the lack of incentive to industrial concerns in view of the lack of markets in the civil economy. The military Services are the great beneficiaries of these developments and it is proper that they finance the initial outlay.

Discussion:

The question was raised as to how the MAB report could be helpful in the current problem of the FY 1958 R&D budget (ITEM 2, above). It was concluded that the time of availability of the report would permit influencing of adjustments only, but that the report could be a great use in the following year's budget.

The problem of radiation resistance of materials was raised from the standpoint of whether this is a responsibility of the Atomic Energy Commission or the Department of Defense. The effects of radiation on electronic equipment and materials can make or break a situation. It was agreed that it may be timely to clarify managerial responsibilities in such specific areas of activity.

Further discussion centered on the collateral support pattern of materials research, such as may be gained through the support of basic research by the National Science Foundation. Note was taken of good working level coordination between the military Services and the Foundation, a coordination developed to the extent that proposals are exchanged and shared on a monthly basis.

From the point of view of attraction of the scientific community to materials research, it was noted that nuclear physics is the strong magnet of attraction and that not many universities in the nation have a first-class metallurgical activity. The point was made that metallurgy is a derivative science like oceanography and meteorology, and that a main problem is how to populate adequately the profession in these derivative sciences. It is not only a matter of inspiring the student of rising capability but the teachers, too: the latter get siphoned off to other activities. This is partly the consequence of the fact that in American universities there is an insufficient range of opportunities to attract and retain teacher talent in the derivative sciences.

The observation was made that any support of basic research in colleges and universities will result in benefits beyond the actual research products, such as a crop of graduate students trained in the

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field. It is in this respect that a 3-year contract for basic research would do wonders through the provision of continuity of students in the activity long enough for them to earn their doctorates. The further point was made that basic research itself is getting to be a more complex endeavor, and that it is a rare event for the scientist to make a significant contribution over a span of time as short as one year.

ITEM 4 - Research in Special Operations (CONFIDENTIAL)

Presentation:

Dr. Schramm called on Mr. Edward Wetter, Secretary of the Advisory Panel on Research in Special Operations, to present the current status of the program. A summary of the factual data presented is attached (TAB C, "DOD Special Operations Research and Development Program, FY 1957, December, 1956").

Noting the highly fluctuating support levels of special operations research in the DOD budgets over the years (\$4.2 millions in FY-53, \$0.47 million in FY-56, and \$0.75 million in FY-57), Dr. Schramm characterized the situation as discouraging, not only from the point of view of evidencing indecision on the part of the Military Departments themselves on the need for and importance of the area, but also from the point of view of the scientific community: these funds are not supporting the research of a single top-flight social scientist.

Dr. Schramm pointed out further that what may be lacking is a certain critical size of effort, both in terms of men and money, over the years. Below the critical size there is no progress of consequence.

He ventured his own view that there is a great military need for for the area: i.e., psychological warfare to influence the opinions, emotions, attitudes and behaviors of peoples to support the accomplishment of national policy and aims; the interrelated fields of guerilla warfare, evasion and escape, and subversion against hostile states; civil affairs and ^{military} government; and related intelligence and planning. In either the event of one large nuclear war or a great many brush fires, or both, we are not prepared; and our experience is nil.

Dr. Schramm posed the question: Do we have the theory, the method to do the job? He answered that we have not, if we take competence in physics as a comparative standard. But the theory is developing. He expressed his conviction that we could assemble the good social scientists of the country to work on the problem if we had a climate of adequate, stable support, and some understanding of what constitutes proper technical direction.

Discussion:

The thought was advanced that perhaps the area is one which deserves support and direction at the OASD(R&D) level. What would be the view of the Military Departments in this respect? Would they propose or endorse support at this level?

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It was observed that the objective of a good part of special operations is to keep out of war: this is the essence of a design of a deterrent to war. There is agreement of the importance of the field, but where should direct responsibility for productive research effort rest? Some members thought that Army G-2 (Intelligence), Navy Office of Naval Intelligence, Air Force A-2 (Intelligence) have responsibilities which are germane to the interests of special operations.

Discussion closed on the note that the social scientists do not work good in groups unless they are engaged in fundamental research, and where results for application are demanded, the interest of the sponsoring agencies vanishes because methodology appears not to be forthcoming. The thought was voiced that, if the social scientists were to demonstrate that they had a methodology, an adequate and stable support for these programs would almost certainly be automatic.

The sense of agreement was that the Defense Science Board should give a second and more intensive consideration to this important area at its next meeting.

ITEM 5 - Interchange of Technical Information (FOR OFFICIAL USE ONLY)

Dr. W. J. Sweeney had invited the attention of the Assistant Secretary of Defense (R&D) to the need for consideration at the policy-making level of certain problems involved in the interchange of technical information between and among the Military Departments, their contractors, and concerns doing voluntary research. See TAB D, Dr. Sweeney's memorandum of 22 October 1956. Dr. Furnas' reply to Dr. Sweeney (TAB E) referred to staff actions underway within OASD(R&D) on these problems and augmented aspects resulting from the hearings before the Moss Congressional Subcommittee, the Coolidge report to the Secretary of Defense by the Committee on Classified Information, and other interests.

Presentation:

Mr. Samuel E. Clements, Director, Planning Division, OASD(R&D), briefed the Board on the actions underway to ascertain policies and procedures in the interchange of technical information and needed improvements in those policies and procedures. He reported that:

- a. There is an increasing awareness that benefits to the Defense program, and hence our over-all defense posture, will result from improved procedures in interchange of information;
- b. There are trends on exchange of information that arise from the development of our relationships with the NATO countries;
- c. There is deep concern over the leaks of important information to the public press, and that unwarranted over-classification contributes to this undesirable situation; and

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d. Solutions to interchange of scientific and technical information do not rest solely with the ASD(R&D), since he does not have specifically assigned functions in this regard. It is true that the ASD(R&D) is the top scientific DOD official interested in the welfare of science, but he has no specific responsibility for policy in this field.

From a philosophical point of view there is agreement that a need exists for military security and that security procedures militate against maximum technological progress. The problem is one of determining the desirable middle ground and striking the proper balance in policy and procedure.

The actions presently under way within the OASD(R&D) comprise:

- a. Review of the Armed Services Technical Information Agency (ASTIA) operations, particularly with respect to its FY-58 program;
- b. Participation on the Military Information Control Committee with respect to release of classified information to our allies;
- c. Contributions to the activities of the Moss Congressional Subcommittee and the President's Government Committee on Security.

Present activities center mainly in a factual determination of just what our present procedures are; in this respect, we are frankly plagued by ignorance. The OASD(R&D) Technical Advisory Panel on Electronics has been asked to undertake an analysis of an appropriate segment of scientific and technical knowledge in its field of interest which it is hoped will demonstrate the pressures of developments which lead from highly classified security information on the one hand to de-classification and release to the public domain on the other.

Mr. Clements concluded by noting that Dr. Furnas had also placed this topic before the R&D Policy Council.

ITEM 6 - Some Highlights of WSEG Studies (CONFIDENTIAL, as extracted)

Dr. A. G. Hill and Mr. Bert F. Brown of the Weapons Systems Evaluation Group presented the findings of that Group on:

- a. Weapons systems for limited or peripheral wars,
- b. The countermeasures and counter-countermeasures problem, and
- c. Background planning with respect to air defense.

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The findings presented were in the nature of "privileged information" to the Board---information not to be released and not JCS-approved at this point of development. Security classification of the presentation was also beyond that assigned this record of the proceedings of the Board meeting.

Accordingly, no report on details of this presentation will be given here.

Salient points resulting from the presentation and discussion are:

- a. WSEG findings would support the importance of special operations (ITEM 4, above) in so far as guerrilla warfare and the development of indigenous forces (and their behavior and control) for limited warfare are concerned;
- b. There would appear to be a need for a kill potential of conventional-type weapons comparable to that of nuclear weapons (reference: question (6), ITEM 2, page 8, DSB 3/1);
- c. In the usual analysis of the effectiveness of counter-countermeasures, only the technical threat is considered with no regard for the enemy's intentions or tactics;
- d. We have an inherent large capability for "self-jamming".

One can envisage tremendous improvement in these problems but it is not alone a matter of research or invention.

ITEM 7 - Proposal for a Defense Science Symposium (UNCLASSIFIED)

Presentation:

Details of the proposal and the argument in its support were provided with the agenda (OS 200/1, TAB C, DSB 2/2).

Discussion:

Noting that the proposal was made in the context of an OSD-sponsored unclassified science symposium, there was clear agreement that the usual scientific and technical societies provide the medium for presentation of such papers; further, that awards for scientific accomplishments in the unclassified realm are made by the professional societies. In so far as suitably awarding the scientist who is affiliated with the Government, the observation was made that IRE has the Harry Diamond Award which requires for eligibility employment by a Government laboratory. It was thought that other professional societies might well be encouraged to extend such a practice.

Apart from the specific proposal before the Board, note was taken of the desirability of fostering an annual meeting of the

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responsible civilian managers of Government technical laboratories and encouraging a forum for discussion of their common problems and ways and means of achieving desired objectives. Such meetings are now held periodically by the senior scientists of Navy installations. It was thought that OASD(R&D) was a good focal point for attraction of such gatherings; perhaps it might serve as a means of unlocking the classification problems on scientific and technical information. Dr. Kern offered the experience in Navy medicine; such gatherings in that field of interest proved extremely useful in the exchange of ideas. Dr. Howde pointed out that the senior Army civilian scientists had recently held two such meetings.

Follow-up Action:

The Board deferred specific recommendations pending a staff exploration of activities currently under way within the Military Departments.

ITEM 8 - Formalization of Views on Background Research and Development
(FOR OFFICIAL USE ONLY)

The Board convened in executive session for this and subsequent items.

The Board proposed the following action:

(1) That a strongly worded statement is desired on a defense research effort that looks toward the next generation of weapons;

(2) That such a statement be consistent with Executive Order 10521--"Administration of Scientific Research by Agencies of the Federal Government"; and

(3) That, in the light of the discussion and some suggestions on suitable wording, Dr. Furnas and Mr. Lukes draft a statement as promptly as possible and canvass the Board members by mail for concurrence in, or further modifications of, the draft statement.

(NOTE: The Executive Secretary undertook the actions requested and, on 17 December 1956, initiated the canvass of Board members by mail. Two-thirds of the members and the alternates canvassed concurred in the statement as worded; the majority of the remaining one-third requested only minor modifications in wording.

The statement of the Board's position on the research needs of the Department of Defense, taking into account members' views in the aggregate, is attached (TAB F)).

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ITEM 9 - Formalization of Views on Organization for Research and Development
(FOR OFFICIAL USE ONLY)

The members present drew up and adopted a statement on the basic and important organizational aspects of research and development, laid before the Board by the Assistant Secretary of Defense (R&D) for advice and comment.

The statement adopted was provided the Assistant Secretary of Defense (R&D) at the close of the meeting. Distribution is being effected separate from these minutes.

ITEM 10 - Future Business (CONFIDENTIAL)

Two items of major business were scheduled for the next meeting, particularly in the light of the previous presentations and discussion:

(1) Research in Special Operations

It was clear that the Advisory Panel on Research in Special Operations has some specific recommendations which are deserving of further Board consideration. The report from the Weapons Systems Evaluation Group was also considered to be of much value. Though there are at present some unanswered questions such as:

(a) Is this a weapon for the military?

(b) Can we effectively use special operations as a weapon vis-à-vis the Soviets?

(c) If there is a military responsibility for this effort, where organizationally should that responsibility be vested?,

the conviction was expressed that the research and development community would have to outline a desirable program, to be followed, if need be, by JCS consideration of where the mission should reside.

Follow-up Action:

It was agreed that Dr. Schramm and Mr. Wetter would develop another presentation for the Board.

(2) Combatworthiness of Weapons Systems

To attain a better focus on combatworthy problems and as a means of conducting a realistic appraisal of our research and development effort as to deficiencies in the light of the military needs, the Board agreed to schedule

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this item for major attention at its next meeting. At Dr. Furnas' request, Dr. Doolittle agreed to develop an appropriate supporting study and outline a suitable presentation to the Board.

ITEM 11 - Organizational Matters (UNCLASSIFIED)

a. Charter of the Defense Science Board

Draft #2 of the suggested charter of the Defense Science Board (RD-DSB 95/1, TAB D, DSB 2/2) was considered. The Board expressed satisfaction with the wording except for Section III--SCOPE and moved unanimously to include within the scope ". . . specific advice will be rendered on the Department of Defense research and development program, such as the program and administration of basic research, component research, advancement of the state-of-the-art in areas of interest to the Department of Defense, and the effectiveness of research and development in providing combatworthy weapon systems." (underscoring denotes additions)

(NOTE: The Defense Science Board charter was issued on 31 December 1956 as Department of Defense Instruction No. 5128.31, copy of which is attached as TAB G.)

b. Selection of Fixed Calendar Days as Meeting Dates

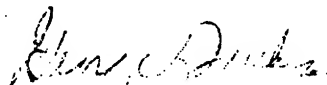
Board meetings will be held on the third Wednesday of February, May, September, and December, when such meetings are held in Washington, D. C.

ITEM 12 - Other Business

None.

ITEM 13 - Date, Time, and Place of the Next Meeting

The Third Meeting of the Board was set for 0930 on 20 February 1957 in Room 3E-1060, The Pentagon, Washington, D. C.



GEORGE D. LUKES
Executive Secretary

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DSB 3/1
Addendum

13 December 1956

Proposed corrections to the minutes (DSB 3/1) of the First Meeting of the Defense Science Board that have come to the attention of the Executive Secretary:

Page 8: Last question under (6) should be modified to read:
"What is our posture in conventional weapons for limited wars?"

Page 9: Last sentence of paragraph at top of the page should be modified to read:
"There was speculation that the NATO countries might not wish to be defended by atomic weapons; our defense posture is then not optimized unless we have all kinds of strength."

Page 10: Last sentence of the sixth paragraph should be modified as follows:
"Although a considerable amount of fine engineering talent has been devoted to this topic, about all that has been gained is an education to the problem; there is not yet a solution, although some groups are engaged in a program of investigation."

Reason for this modification: The Army has called attention to its Project PLATO and its NIKE series of studies in this area of interest.

DSB 3/1
Addendum
TAB A, DSB 3/2

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EXPLANATORY NOTES FOR CHART: DOD FUNDS AVAILABLE FOR R&D

1. The curve labelled "Total Availability" traces the R&D appropriations as they appear on the financial ledgers.

2. The dotted segment between 1956 and 1957 is the Congressional add-on for the Air Force which has not been released.

3. The crossed-hatched segment from 1954 to 1957 is the effective reduction of funds for actual performance of R&D resulting from accounting adjustments which assess out of R&D appropriations certain overhead charges occasioned by R&D activities.

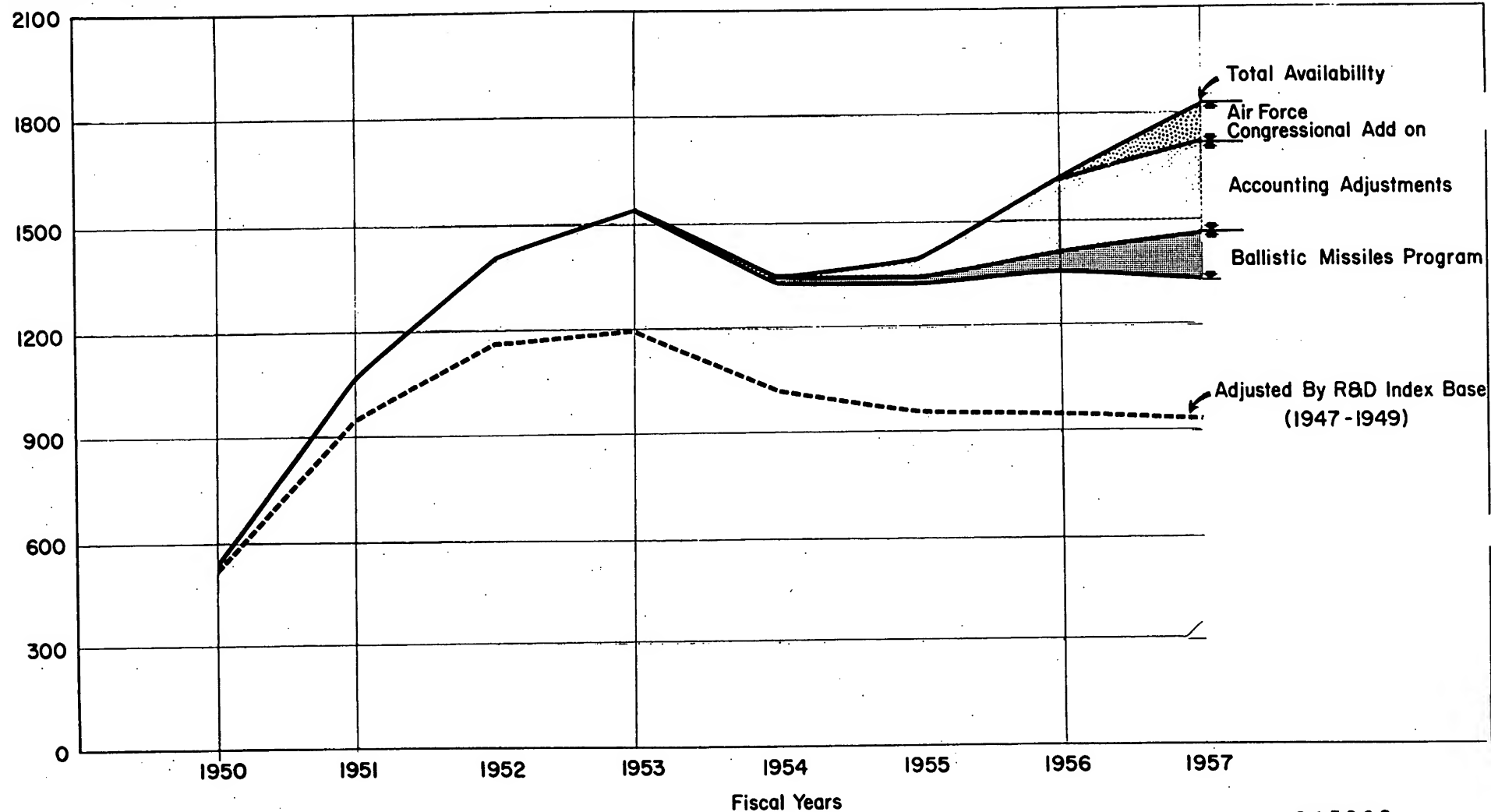
4. The fine-dotted segment from 1953 to 1957 is the ballistic missiles program which originally was intended to be an add-on to the over-all R&D program.

5. The solid curve resulting from subtraction of these segments is the actual support level of R&D. However, in terms of buying power for research and development with funds in these amounts, there is a further decrease in actual performance due to a steadily-rising cost index. Computed from a base of 100 during 1947-49, the index rose to 143.3 in 1956.

6. The net funds available for R&D on a comparable basis for purchase of equipment, materials, and payment of skilled wages and scientific salaries is the dashed (lowest) curve.

DEPARTMENT OF DEFENSE FUNDS AVAILABLE FOR R & D

Millions of Dollars



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**DOD SPECIAL OPERATIONS
RESEARCH AND DEVELOPMENT PROGRAM**

FY 1957

**A Summary of Factual Data Presented to
the Defense Science Board**

December 1956



This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

**Office of the Assistant Secretary of Defense
Research and Development
Washington 25, D. C.**

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TAB C

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OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
RESEARCH AND DEVELOPMENT
Washington 25, D. C.

SPECIAL OPERATIONS - BASIC AREAS

Psychological Warfare: The planned use, in time of war or declared emergency, of propaganda and the exploitation of other actions with the primary purpose of influencing the opinions, emotions, attitudes and behavior of enemy, neutral or friendly foreign groups in such a way as to support the accomplishment of national policy and aims.

Unconventional Warfare: Those operations generally conducted in enemy territory by predominantly indigenous personnel responsive in varying degrees to friendly control or direction in furtherance of military and political objectives. It consists of the inter-related fields of guerilla warfare, evasion and escape, and subversion against hostile states (resistance).

Civil Affairs and Military Government (social science aspects only):

Civil affairs is defined as including all matters concerning the relationship between military forces deployed in a friendly country and the civil authorities and people of that country.

Military government is defined as the form of administration by which an occupying power exercises executive, legislative and judicial authority over occupied territory.

Related Intelligence and Planning Operations: Related intelligence and planning operations include the determination, interpretation analysis and application of intelligence and other factors required in the preparation of military plans for psychological warfare, unconventional warfare and civil affairs and military government.

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OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
RESEARCH AND DEVELOPMENT
Washington 25, D. C.

SPECIAL OPERATIONS - TECHNICAL CATEGORIES

Psychological Warfare

- SP-1 - Social science research on foreign areas in support of psychological warfare.
- SP-2 - Social science research primarily concerned with the development of methods and techniques for support of psychological warfare.
- SP-3 - Materiel research and development in support of psychological warfare.

Unconventional Warfare

- SP-4 - Social science research on foreign areas in support of unconventional warfare.
- SP-5 - Social science research primarily concerned with the development of methods and techniques for support of unconventional warfare.
- SP-6 - Materiel research and development in support of unconventional warfare.

Civil Affairs and Military Government

- SP-7 - Social science research on foreign areas in support of civil affairs and military government.
- SP-8 - Social science research primarily concerned with the development of methods and techniques for support of civil affairs and military government.
- SP-9 - Materiel research and development in support of social science aspects of civil affairs and military government.

Related Intelligence and Planning Operations

- SP-10 - Foreign area social science research on intelligence and planning operations in direct support of psychological warfare, unconventional warfare, and civil affairs and military government.

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- SP-11 - Social science research primarily concerned with the development of methods and techniques for intelligence and planning operations in direct support of psychological warfare, unconventional warfare, and civil affairs and military government.
- SP-12 - Materiel research and development on intelligence and planning operations in direct support of psychological warfare, unconventional warfare, and civil affairs and military government.

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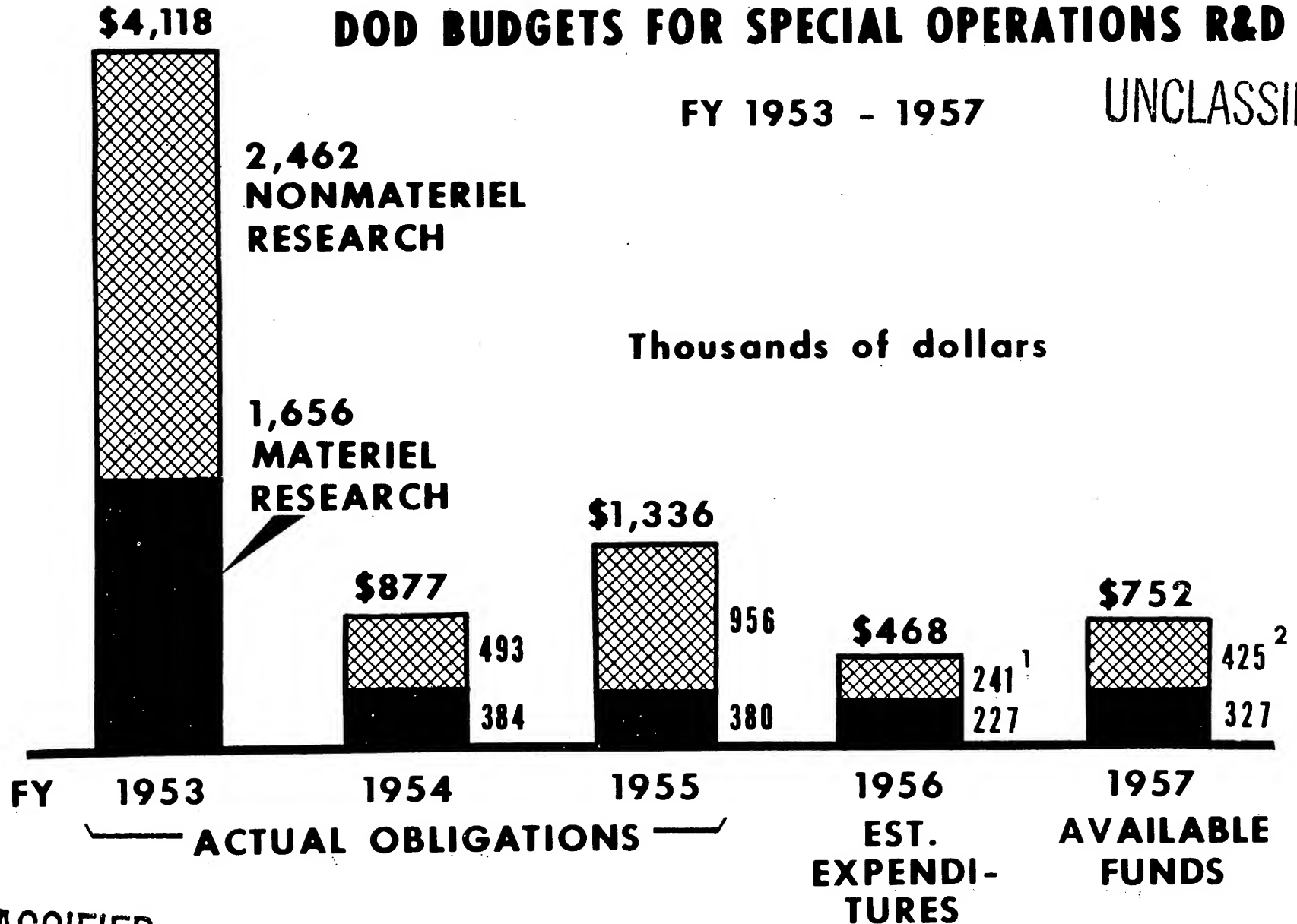
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DOD BUDGETS FOR SPECIAL OPERATIONS R&D

FY 1953 - 1957

UNCLASSIFIED

Thousands of dollars



UNCLASSIFIED

¹ DOES NOT INCLUDE \$285 OBLIGATED BUT NOT EXPENDED

² INCLUDES \$210 FY 56 CARRY-OVER FUNDS AND \$15 ONR FUNDS

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FY 1957 R&D PROJECTS FOR SPECIAL OPERATIONS

Materiel

Dept of the Army

Investigation for Public Address Equip. (32701300)	17,000
Public Address Equipment (32703000)	213,000
Psychological Warfare Visual Systems (33317000)	3,000
QM Equipment Psychological Warfare (79611001)	79,000
Psychological Warfare Sp Forces (89611100)	15,000
Total Materiel	<u>\$327,000</u>

Nonmateriel

Dept of the Army

Psychological Warfare Nonmateriel (9610000) (SORO)	90,000*
A. Demoralization (DEMOR)	
B. Surrender (SURRENDER)	
C. Evaluation of PsyWar Efforts (EVAL)	
D. Motivations and Appeals to Vietnam and Thailand (SEAPSY)	
E. Selection, Classification and Utilization of Indigenous Populations (INDIG)	
F. Use of Symbols in PsyWar (SYMBOL)	

Dept of the Air Force

Intelligence Methodology (7732)	110,000
A. Social Systems Analyses	
B. Population Studies	
C. Urban Target Analyses	
D. Population Recuperability	

Dept of the Navy

ONR Funds for Bibliography (To State Dept.)	15,000
	<u>\$215,000</u>
*FY 56 Carry-over (SORO)	210,000
Total Nonmateriel	<u>\$425,000</u>
Grand Total	<u>\$752,000</u>

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Air Force Requirements Contrasted to Approved Projects

Requirements for FY 1957 (Research Planners)

Social Analysis (7732)	\$188,400
Human Source Exploitation Methods (7733)	120,000
Analysis of Population and Manpower of USSR	100,000
Guide for AF Training on POW Conduct	50,000
Political Effect of Air Power	300,000

<u>Total</u>	\$758,400
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Approved for FY 1957 (Hq., USAF)

Intelligence Methodology (7732)	110,000
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<u>Total</u>	\$110,000
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TABLE I. SUMMARY OF NONMATERIEL RESEARCH PROPOSALS

PSYCHOLOGICAL WARFARE

The planned use, in time of war or declared emergency, of propaganda and the exploitation of other actions with the primary purpose of influencing the opinions, emotions, attitudes and behavior of enemy, neutral or friendly foreign groups in such a way as to support the accomplishment of national policy and aims.

Those operations varying degrees of the interrelate (resistance).

Technical objectives	Field experiments	Case studies	Codification studies
	<u>#1 - Operational Model</u>	<u>#2 - National Level Operations</u>	<u>#3 - Area Data for PsyWar</u>
SP-1. Social science research on foreign areas in support of psychological warfare.	To organize a model operation to test the body of intelligence, planning and organizational information which would be required for psychological warfare operations.	To make a comparative study of the system and practice of psychological warfare at the national level in selected countries.	To help the military services in determining criteria for the kinds of foreign area data specifically required for psychological warfare operations. (See proposals #9 and #14.)
	<u>#4 - Measurement and Evaluation</u>	<u>#5 - Indoctrination of POWs</u>	<u>#6 - Principles of Communication</u>
SP-2. Social science research primarily concerned with the development of methods and techniques for support of psychological warfare.	To evaluate the effectiveness of selected types of psychological warfare operations.	To review and analyze United States experiences in the indoctrination of enemy POWs and to prepare guides for future use.	To identify principles of communication relevant to psychological warfare training and operations.

Technical objectives

SP-4. Social science research on foreign areas in support of unconventional warfare.

SP-5. Social science research primarily concerned with the development of methods and techniques for support of unconventional warfare.

CIVIL AFFAIRS AND MILITARY GOVERNMENT

Civil affairs is defined as including all matters concerning the relationship between military forces deployed in a friendly country and the civil authorities and people of that country. Military government is defined as the form of administration by which an occupying power exercises executive, legislative and judicial authority over occupied territory.

The determination of preparation of military government

Technical objectives	Field experiments	Case studies	Codification studies
		<u>#13 - Foreign CAMG Operations</u>	<u>#14 - Area Data for CAMG</u>
SP-7. Social science research on foreign areas in support of civil affairs and military government.	Note: No field experiments are recommended at this time. Such studies may be required after completion of the suggested case studies and codification studies.	To analyze selected foreign CAMG experiences as a means of (1) improving U.S. CAMG practices, (2) devising a better integration of U.S. and Allied CAMG interests and (3) providing for a better reception of U.S. CAMG efforts by neutrals. (See proposals #15 and #16.)	To help the military services in determining criteria for the kinds of foreign area data specifically required for CAMG operations.
		<u>#15 - United States CAMG Operations</u>	<u>#16 - CAMG Doctrine</u>
SP-8. Social science research primarily concerned with the development of methods and techniques for support of civil affairs and military government.		To contribute to the development of CAMG doctrine by reviewing and analyzing selected cases of previous success and failure in CAMG operations. (See proposals #13 and #16.)	To contribute to the development of CAMG doctrine on management devices, objectives and methods. (See proposals #13 and #15.)

Technical objectives

SP-10. Foreign social science research on intelligence planning operations direct support of psychological warfare unconventional warfare and civil affairs military government

SP-11. Social science research primarily concerned with the development of methods and techniques for intelligence and planning operations in direct support of psychological warfare unconventional warfare and civil affairs military government

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NONMATERIEL RESEARCH PROPOSALS FOR SPECIAL OPERATIONS

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UNCONVENTIONAL WARFARE

Those operations generally conducted in enemy territory by predominantly indigenous personnel responsive in varying degrees to friendly control or direction in furtherance of military and political objectives. It consists of the interrelated fields of guerilla warfare, evasion and escape, and subversion against hostile states (resistance).

Codification studies	Technical objectives	Field experiments	Case studies	Codification studies
#3 - Area Data for PsyWar		#7 - Special Forces Operations	#8 - Guerilla Warfare Doctrine	#9 - Area Data for Special Forces
To help the military services in determining criteria for the kinds of foreign area data specifically required for psychological warfare operations. (See proposals #9 and #14.)	SP-4. Social science research on foreign areas in support of unconventional warfare.	To contribute to the doctrine of special forces operations by testing some of the precepts under field conditions. (See proposal #10.)	To contribute to the doctrine of special forces by reviewing and analyzing certain important foreign cases of guerilla warfare.	To help the military services in determining criteria for the kinds of foreign area data specifically required for special forces operations.
#6 - Principles of Communication		#10 - Special Forces Training	#11 - Guerilla Warfare Support	#12 - Nuclear Weapons and Special Forces
To identify principles of communication relevant to psychological warfare training and operations.	SP-5. Social science research primarily concerned with the development of methods and techniques for support of unconventional warfare.	To contribute to the improvement of the selection and training of special forces personnel. (See proposal #7.)	To contribute to special forces doctrine by reviewing and analyzing cases in which the nature of support has been critical to guerilla success or failure.	To develop briefing materials for special forces on military operations involving nuclear and other modern weapons.

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RELATED INTELLIGENCE AND PLANNING OPERATIONS

The determination, interpretation, analysis and application of intelligence and other factors required in the preparation of military plans for psychological warfare, unconventional warfare and civil affairs and military government.

Codification studies	Technical objectives	Field experiments	Case studies	Codification studies
#14 - Area Data for CAMG		#17 - Foreign Attitude Measurement	#18 - Foreign Governments Special Operations Intelligence Support	#19 - Soviet and Satellite Demography
To help the military services in determining criteria for the kinds of foreign area data specifically required for CAMG operations.	SP-10. Foreign area social science research on intelligence and planning operations in direct support of psychological warfare, unconventional warfare and civil affairs and military government.	To develop better means of estimating the morale and other relevant attitudes of a population to which we do not have full access.	To contribute to the more efficient use of intelligence in special operations by analyzing some previous experiences of foreign governments.	To extend our knowledge of Soviet and satellite demography as related to special operations. (See proposal #20.)
#16 - CAMG Doctrine		#20 - Estimation of Population Characteristics	#21 - Intelligence Utilization	Note: No specific studies are recommended at this time, pending further development of Air Force Project 7732. Meanwhile, the Panel wishes to encourage especially those two aspects which pertain to mechanical sensing techniques and to the generation of intelligence through interrogation of human sources. Proposals #19 and #20 deal specifically with demographic aspects.
To contribute to the development of CAMG doctrine on management devices, objectives and methods. (See proposals #13 and #15.)	SP-11. Social science research primarily concerned with the development of methods and techniques for intelligence and planning operations in direct support of psychological warfare, unconventional warfare and civil affairs and military government.	To develop better and quicker means of estimating population characteristics of an area to which we do not have full access. (See proposal #19.)	To contribute to the more efficient use of intelligence in special operations by analyzing some previous U.S. experiences in that field.	

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OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
RESEARCH AND DEVELOPMENT
Washington 25, D. C.

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October 22, 1956

MEMORANDUM FOR DR. C. C. FURNAS, ASSISTANT SECRETARY OF DEFENSE, R&D

THROUGH: MR. W. M. HOLADAY, DASD, R&D

SUBJECT: Problems of Interchange of Technical Information

The Technical Advisory Panel on Fuels and Lubricants submits that a high level study is needed of the interrelations that exist between and among the military departments, their hired contractors, and concerns doing voluntary research. The achievement of military research goals is hindered because these interrelations are not clearly defined.

The need for such a study has become apparent following the briefing that was given to representatives of industry interested in performing voluntary research on propellants for the government. The letter of invitation to representatives of industry stated, "Perhaps your organization might be interested in doing such work on a voluntary basis if you could obtain a better understanding of the problem."

Among the factors that enter into the overall problem are the following:

Interchange of Technical Information: Recognizing that it is wasteful of technical manpower to knowingly permit duplication of effort, it appears desirable to acquaint any "volunteer" with the work being done by others. The question arises, however, as to how this can be done. The three military departments are not in agreement as to whether security permits dissemination of reports and information to an organization that has entered into no contract with the military. It is the opinion of the Technical Advisory Panel on Fuels and Lubricants that "need to know" should not be predicated solely on the basis of contractual relations; that the probable benefits that might accrue to the government should determine the establishment of a "need to know"; and that this question should be determined by a technical office rather than by a military security office.

Proprietary Information: An organization usually is awarded a contract for research because it has some background and has established some degree of competence in the field. The government is entitled to knowledge obtained as a result of the contract, but the question arises as to whether the government is entitled to information developed by the researcher prior to the time when a contract existed. The \$1-a-year contract raises other questions, such as, how much information can be required of the contractor who gets only \$1 a year. Such a researcher

would appear to have a better basis for asserting proprietary rights than one operating under a cost contract.

It was the consensus of the Steering Group of the Technical Advisory Panel on Fuels and Lubricants, at its meeting on 4 October, that this whole problem of relationships might appropriately be placed before some high-level policy agency such as the Defense Science Board or the Research and Development Policy Council.

W. J. Sweeney
Chairman, Technical Advisory
Panel on Fuels and Lubricants

ASSISTANT SECRETARY OF DEFENSE
Washington 25, D.C.

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Research and Development

November 30, 1956

Dear Bill:

I want to acknowledge your memorandum of October 22 on the need for consideration at the policy-making level of certain problems involved in the interchange of technical information between and among the military departments, their contractors, and concerns doing voluntary research.

This is indeed an important part of a really fundamental problem. Some time ago I asked my Research and Development Policy Council to consider another aspect of the over-all situation, particularly, that of de-classification of technical information. More recently, the general problem of the policies of the Armed Services Technical Information Agency has been raised in many quarters.

I appreciate very much the action your Panel has taken in bringing its concerns on this to my attention. The topic will be on the agenda of the December 13 meeting of the Defense Science Board. Since we have underway at present a staff study of the policies and practices of the military departments on interchange of scientific and technical information, as well as on de-classification, I believe that we can at best give only a status report on the situation at the December meeting. I assure you, however, that I intend to keep the matter as an item before the Board and the R&D Policy Council for needed attention and definitive action.

Sincerely yours,

/s/ C. C. FURNAS

Dr. W. J. Sweeney
Vice President
Esso Research and Engineering Co.
15 West 51st Street
New York 19, New York

23 January 1957

MEMORANDUM FOR ASSISTANT SECRETARY OF DEFENSE (R&D)

FROM: Defense Science Board

SUBJECT: Statement of Position on the Research Needs of the Department of Defense

The Defense Science Board has considered the broad features of the military research and development program, particularly from the point of view of the support levels of fundamental research, applied research, and component development vis-à-vis the development of weapons and weapons systems.

It is clear that a forward-looking research program at a proper support level is absolutely essential to national security if our nation is to maintain its present position of technological superiority in the world. The Board finds a considerable measure of satisfaction in our national policies, as promulgated by the President in Executive Order 10521 (March 17, 1954), which recognize that useful applications of science to defense, among other purposes, require a strong foundation in basic scientific knowledge and trained scientific manpower; and further, which recognize that the conduct and support of fundamental research in areas closely related to the missions of the Federal agencies is important and desirable.

The Board fears that the Department of Defense is devoting insufficient emphasis to a forward-looking research program, particularly in relevant fundamental areas, which is so vital to the evolution of novel weaponry. Restraints on military research and development expenditures during a period of years of rising costs and exceedingly complex technological developments are undoubtedly a major contributing factor to the current imbalance in support levels between forward-looking research and the development of weapons and weapons systems. The Board is deeply concerned over the trends which indicate that vital defense objectives for the next generation of weapons are being jeopardized by a proportionately inordinate amount of attention to immediate weapon refinements and some dissipation of efforts and funds on duplicative weapons development.

Recognizing the need for restraints on military expenditures for research and development, the Board recommends:

- (1) That a larger portion of the funds available be devoted to a forward-looking research program comprised of the areas of fundamental, applied, and component research which underlie the development of weapons, weapons systems, and devices of warfare; and
- (2) As a means of achieving a more effective military research and development program, that more selectivity and greater discrimination be exercised as to weapons programs to be pursued through the development cycle.



Department of Defense Instruction

Defense Science Board Charter

SUBJECT

- References:
- (a) Department of Defense Directive No. 5128.7, "Responsibilities of the Assistant Secretary of Defense (Research and Development)," 12 November 1953
 - (b) Department of Defense Directive No. 5128.11, "Responsibilities of the Assistant Secretary of Defense (Research and Development)," 4 October 1956

I. GENERAL

In accordance with the general provisions of references (a) and (b), the Defense Science Board is hereby established in the Office of the Assistant Secretary of Defense (Research and Development) with the purpose, membership, and mode of operation defined as follows:

II. PURPOSE AND MEMBERSHIP

The Defense Science Board, composed of 25 members appointed from civilian life by the Assistant Secretary of Defense (Research and Development), advises the Assistant Secretary of Defense (Research and Development) on scientific and technical matters relating to research and development in the Department of Defense.

The Board shall consist of:

- (1) The Chairman of the Army Scientific Advisory Panel or his designated alternate; the Chairman of the Naval Research Advisory Committee or his designated alternate; and the Chairman of the Air Force Scientific Advisory Board or his designated alternate.
- (2) The Chairman of each of the OASD(R&D) Technical Advisory Panels
- (3) Seven members-at-large
- (4) In view of common interest in the subject matter:
 - (a) The President of the National Academy of Sciences or his designee;
 - (b) The Director of the National Science Foundation or his designee;

(c) The Director of the National Bureau of Standards or his designee;

(d) The Director of the National Advisory Committee for Aeronautics or his designee.

The Assistant Secretary of Defense (Research and Development) shall designate the Chairman of the Board from the above membership and shall provide an executive secretary and such supporting staff as needed.

III. SCOPE

The Board shall devote major attention to delineating the scientific opportunities which hold promise of radically outdating present-day concepts of warfare and will exercise the leadership in stimulating and conducting broad studies which involve the scientific potential for new opportunities of warfare.

Specific advice will be rendered on the Department of Defense research and development program, such as the program and administration of basic research, component research, advancement of the state of the art in the areas of interest to the Department of Defense, and the effectiveness of research and development in providing combatworthy weapon systems.

IV. OPERATION

The procedures for developing the advice and findings of the Board shall be as flexible as is consistent with the above purpose. The Chairman will work with the Assistant Secretary of Defense (Research and Development) in augmenting, when necessary, task forces on Board problems through selection of members of the OASD(R&D) Technical Advisory Panels to review and advise on important problems in their fields of competence. When appropriate, and subject to the concurrence of the Assistant Secretary of Defense (Research and Development), members of the Board may collaborate with appropriate members of the Military Departments and with civilian scientists in conducting broad studies which hold promise of suggesting new development approaches.

The Board will be advisory to the Assistant Secretary of Defense (Research and Development). At the discretion of the Chairman of the Board, and subject to the approval of the ASD(R&D), the Chairman may designate an Executive Committee comprised of members selected from the Board for orderly management of tasks or studies assigned to, or undertaken by, the Board.

The Executive Secretary shall provide for such assistance as needed by the Chairman and other members of the Board. He shall be responsible for keeping the Board members informed, either by staff studies or through the arrangement of appropriate briefings, on the military research and development programs to the extent necessary for the Board's tasks and on the research and development programs of other Federal agencies to the extent that such programs bear collaterally on the field of interest of the Board.

V. RELATION TO TECHNICAL ADVISORY PANELS

Nothing in the foregoing is intended to modify the terms of reference of existing Technical Advisory Panels. The Defense Science Board will give integrated consideration to broad problems of unusual significance in Department of Defense research and development activities, and its functions will accordingly be complementary to those of the Technical Advisory Panels.

C.C. Furness

Assistant Secretary of Defense
(Research and Development)

Ces Files

Information: The condensed telephone directory lists Mr. Lukes' telephone extension as "54147", should be changed to 54157.

The same directory lists "Room 3E-1075", should now, due to a recent move, be changed to Room 3E-1085 (entrance to 3E-1083)

Request: In addition to having DSB put on distribution lists for a copy of each agenda and minutes issued by your office, please include DSB on distribution for one copy of each issue of your roster (a copy of your current roster would be appreciated at this time).

E. Berka

MAR 6 1957

1 copy rec'd

Mr. Lukes	W	3/6
Mr. Berka		
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NUMBER 5128.31
DATE December 31, 1956

CES

ASD(R&D)

Department of Defense Instruction

SUBJECT

Defense Science Board Charter

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JAN 6 1957

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C.C. Furness

Assistant Secretary of Defense
(Research and Development)

MEMORANDUM FOR CORRESPONDENTS

No. 159-M
May 13, 1993

Defense Secretary Les Aspin today pronounced the "end of the Star Wars era" as he renamed the Strategic Defense Initiative Organization to reflect the Clinton Administration's concentration on new dangers of the post-Cold War world.

"From now on, SDIO will be the Ballistic Missile Defense Organization. This signals the end of the Star Wars era and it signals the end of a battle that has raged in Washington for a decade over the best way to avoid nuclear war. That battle was over whether we should build a massive defense against a missile attack from the Soviet Union or press for arms reduction backed by traditional deterrence," Aspin said.

"Like many Washington battles, it wasn't decided on the merits. It just went on so long that circumstances changed the terms of the debate. The fate of Star Wars was sealed by the collapse of the Soviet Union," he said.

The Star Wars decade began on March 23, 1983 when then President Ronald Reagan announced he was launching a program to "render nuclear weapons impotent and obsolete." His strategic defense program was quickly dubbed Star Wars after the popular movie of that name.

"Ten years later, we find we have a real need for ballistic missile defense, but not the massive program of space-based weapons that Ronald Reagan envisioned," Aspin said.

"Saddam Hussein and his Scud ballistic missiles showed us that we need ballistic missile defense for our forces in the field. That threat is here and now," he said. "In the future, we may face hostile or irrational states that have both nuclear warheads and ballistic missile technology that could reach the United States," he went on.

"That's why we've made theater ballistic missile defense our first priority to cope with the new dangers of the post-Cold War era," Aspin said.

After theater ballistic missile defense, BMDO's priorities are National Missile Defense, which is defense of the American people, and Follow-On Technologies that offer promise in both tactical and strategic defense.

(more)

"These changes represent a shift away from a crash program for deployment of space-based weapons designed to meet a threat that has receded to the vanishing point: the all-out surprise attack from the former Soviet Union," he said.

Since its inception in 1984, SDIO had reported directly to the Secretary of Defense. The new arrangement has the BMD Organization reporting to the Undersecretary of Defense for Acquisition and Technology, John M. Deutch.

"This shift reflects the fact that the program will be shifting from research to development and acquisition of systems. And it will allow us to manage our work on ballistic missile defense in a way appropriate to its place in the overall defense program," Aspin said.

President Clinton's budget proposed no increase in funding for Fiscal Year 1994 BMDO compared to FY 1993's funding for SDIO. Funding was reordered to reflect the change in priorities. The budget asks \$3.8 billion for BMDO in FY 1994.

END

BMD O

REPORT ON THE BOTTOM-UP REVIEW



Les Aspin
Secretary of Defense

October 1993

SECTION V: MODERNIZATION

BALLISTIC MISSILE DEFENSE

Throughout the Cold War, both the United States and the Soviet Union conducted research and development on ways to defend against nuclear-armed ballistic missiles. With the signing of the Anti-Ballistic Missile (ABM) Treaty in 1972 banning nationwide ABM systems, the issue of ballistic missile defense (BMD) was relegated to a less prominent status. Beginning in March 1983, ballistic missile defense gained new prominence with the unveiling of the Strategic Defense Initiative (SDI). Throughout the next decade, the SDI program engendered significant debate with regard to its viability and cost.

The Problem

Despite a decade of research and an investment of \$30 billion, most experts inside and outside the Department of Defense agree that we are far from deploying a highly effective defense against a large-scale missile attack. Furthermore, as a result of the strategic arms reduction agreements recently negotiated with the former Soviet Union and the dissolution of that country, the principal threat against which such a system was originally designed has drastically declined.

In response to these developments, and because the Congress had consistently failed to fund the scale of SDI program that the executive branch proposed, the Bush Administration refocused SDI toward a more limited defense of the United States and its allies, called Global Protection Against Limited Strikes (GPALS). The Bush program called for spending an additional \$39 billion for ballistic missile defense in FY 1995-99 — an amount that would have constituted a significant portion of the modernization dollars in the DoD budget.

In his FY 1994 defense budget request, President Clinton decided to scale back investments in missile defenses from \$6.3 billion under the Bush plan to \$3.8 billion. This reduction reflected this Administration's skepticism about the need for early deployment of a

national missile defense and a desire both to reorient the program toward theater missile defense and to fund overall missile defense research and development at a sustainable level.¹

The Bottom-Up Review thus examined U.S. missile defense requirements from a perspective of identifying options that could meet future needs at an affordable cost.

The Threat

There are three general categories of long-range missile threats to the United States: deliberate attacks by the former Soviet Union or China, accidental or unauthorized launches from those countries, and the emergence of new long-range missile threats from potentially hostile nations.

If Ukraine, Belarus, and Kazakhstan ratify and implement START I and join the Nuclear Nonproliferation Treaty as nonnuclear states, Russia will be the only country of the former Soviet Union possessing missiles capable of reaching the United States. Once START II is implemented, Russian strategic nuclear forces will be much smaller than they are today and strategic modernization is expected to proceed at a slower pace. While China also has a few nuclear missiles that could reach the United States, its strategic nuclear force is quite small now, and it is likely to grow slowly in both size and capability over the next decade. A deliberate attack by Russia or China on the United States would appear to be highly unlikely.

Accidental or unauthorized launches of Chinese or former Soviet nuclear missiles are also considered

¹ The term *theater missile defense* (TMD) refers to defenses against shorter-range theater and tactical missiles that might be used against forward-deployed U.S. forces or U.S. allies. A *national missile defense* (NMD), by contrast, would defend against long-range strategic missiles that might be used to attack the United States directly.

unlikely. Both countries appear to maintain effective nuclear weapon control procedures to preclude such an event.

Finally, while no other potentially hostile nation currently possesses the capability to threaten the United States with ballistic missiles (and probably none will acquire such a capability for the next several years), the possibility of a limited ballistic missile threat from the Third World sometime in the first decade of the next century cannot be excluded.

However, a different threat of particular concern in the post-Cold War period is the proliferation of shorter-range ballistic and cruise missiles armed with nuclear, biological, or chemical warheads. Ballistic and cruise missile deployments are expected to increase worldwide, despite stepped-up efforts to inhibit their proliferation, and several countries other than the acknowledged nuclear states are developing both nuclear weapons and ballistic missiles. Similarly, a number of countries have or are developing chemical or biological weapons that could be delivered by ballistic or cruise missiles.

Treaty Compliance

The ABM treaty, as amended in 1974, permits a single missile defense site equipped with ground-based tracking and guidance radars and up to 100 fixed, land-based interceptor missiles. The treaty prohibits mobile land-based, air-based, sea-based, and space-based ABM systems or components. The Bottom-Up Review considered program options that are treaty compliant as well as options that would require relief.

One option would be to deploy an ABM system that could provide a limited defense of the continental United States against a small-scale missile attack. Such a system, deployed at a single site in Grand Forks, North Dakota, would consist of a ground-based radar (GBR), 100 ground-based interceptors (GBIs), and upgrades to our existing early-warning radar system. While such a system would provide nationwide coverage against some types of attacks, levels of protection for substantial areas of the eastern and western United

States would be inadequate in the event of other attacks.

Other options involve multiple sites, additional interceptor missiles, and/or reliance on missile tracking information from space-based sensors. These options are being examined in the context of a Presidential review of our BMD program and the ABM treaty. They raise ABM treaty compliance issues that must be resolved within the government and within the framework of our dialogue with Russia and perhaps other countries of the former Soviet Union before development or deployment could proceed. The present political instability in Russia could make it very difficult to negotiate such modifications to the ABM treaty for the foreseeable future.

Core Theater Missile Defense Program

To meet the growing threat from shorter-range theater ballistic and cruise missiles, the Bottom-Up Review considered a range of theater missile defense options. All options include a "core" set of TMD systems consisting of an enhanced version of the existing land-based Patriot air and missile defense system, called Patriot Advanced Capability, Level-3 (PAC-3); the sea-based Aegis/Standard Missile Block IVA; and the land-based Theater High-Altitude Area Defense (THAAD) missile system (see Figure 9).

Patriot Advanced Capability Level - 3. Our current ability to intercept shorter-range ballistic missiles is limited to the Patriot PAC-2 missile, which was used with partial success against modified Iraqi Scud missiles during the Gulf War. The immediacy of the tactical ballistic missile threat argues strongly for rapid deployment of improved theater missile defenses, such as PAC-3, that provide greater lethality and range, and are more capable against longer-range threats. PAC-3 would include an improved radar and either an upgraded Patriot missile or a new "hit-to-kill" interceptor missile.

The Aegis/Standard Missile Block IVA. The Navy currently deploys many cruisers and a growing number of destroyers equipped with Aegis radars and

Standard missiles for air defense operations. The Block IVA program would capitalize on this existing infrastructure by fielding upgraded Standard missiles and a modified Aegis radar to provide a sea-based TMD capability and improved performance against antiship cruise missiles. In some circumstances, a naval TMD capability could be in place in the vicinity of a regional conflict, providing protection for land-based targets before hostilities break out or before land-based defenses can be transported to the theater.

Theater High-Altitude Area Defense System.

While modifications of existing systems can deal with most existing ballistic and cruise missile threats, the THAAD system is included in the core TMD program because additional capabilities will be needed to counter more advanced threats anticipated in the future. THAAD would defeat longer-range ballistic missiles, thereby minimizing the effects of weapons of mass destruction on the ground, and would also defend a larger area. When combined with either PAC-3 or the Standard Block IVA missile as a lower defensive tier,

THAAD would anchor a highly effective layered defense of critical assets.

Brilliant Eyes. Brilliant Eyes (BE) missile tracking satellites offer the potential for significantly enhancing the capabilities of the core theater missile defense effort. Brilliant Eyes satellites would provide an autonomous missile surveillance and tracking capability for a number of regions of interest, or if cued by global surveillance satellites, they could observe missiles soon after launch. The unique contribution of BE is high-precision midcourse tracking, which allows interceptors to be launched when incoming missiles are still beyond the range of land- or sea-based radars. This means that intercept ranges would increase, particularly for long-range, wide-area defensive systems such as THAAD.

Brilliant Eyes missile tracking data could also be used for interceptor guidance updates, further increasing the defended area and offering a hedge against radar countermeasures or the loss of a radar. In

Theater Missile Defense

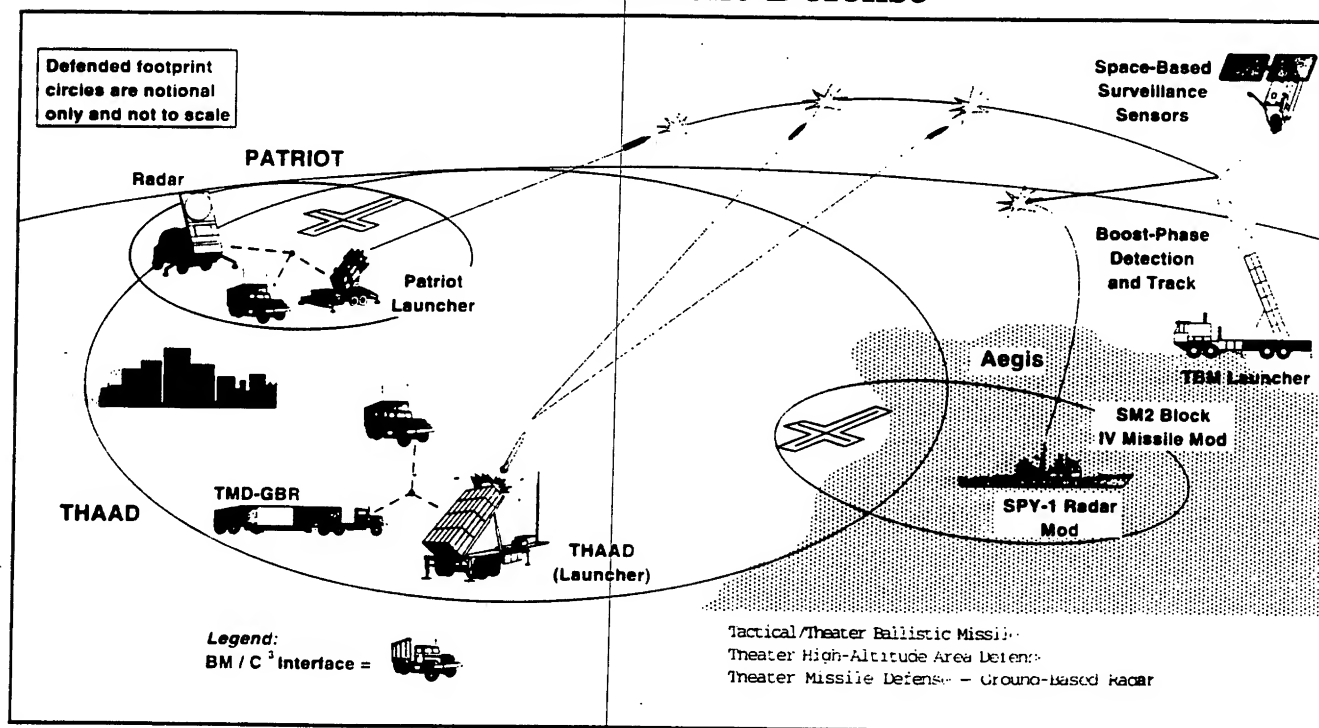


Figure 9

peacetime, the BE constellation could help collect intelligence data on emerging threats. A DoD working group is examining whether Brilliant Eyes might also have a role to play in fulfilling future strategic early-warning and surveillance requirements.

Additional TMD Programs

In addition to the core TMD program and Brilliant Eyes, the Bottom-Up Review examined the advantages and costs of proceeding with several other proposed TMD programs: a sea-based upper-tier program, the Army's Corps Surface-to-Air Missile (SAM) system, and ascent/boost-phase intercept capabilities.

Sea-Based Upper Tier. All sea-based concepts for higher-altitude missile ("upper tier") intercepts take advantage of the Vertical Launch System on naval combatants and offer very long-range intercept potential when supported by BE or some other over-the-horizon sensor. This is particularly true for concepts using an upper-stage intercept element based on Lightweight Exoatmospheric Projectile (LEAP) technology and carried by the Standard missile. These sea-based systems could provide extensive area protection.

Corps SAM. This new mobile air and missile defense system would protect Army or Marine maneuver forces against short-range ballistic missiles and advanced cruise missiles fired from any direction. In addition, Corps SAM would be more transportable, more mobile, and have more on-line missiles per battery than the Patriot PAC-3.

Ascent/Boost-Phase Intercept. We will also investigate the feasibility of defensive systems having earlier intercept capabilities so that enemy missiles could be destroyed while they are still ascending. This would be a joint Air Force-Ballistic Missile Defense Organization (BMDO) program.

TMD Options

Four TMD options that build on the core program were examined. The options differ with respect to the

ways in which they supplement the core program and the time period in which the additional programs they provide would proceed through the acquisition process.

Option 1: Core TMD Program Plus Sea-Based Upper Tier and Corps SAM. This option, consisting of the core TMD program (PAC-3, THAAD, Standard Missile Block IVA) plus both the Sea-Based Upper Tier and Corps SAM systems, was the Bush TMD program. Proceeding with all five of these major system acquisitions would require about \$14 billion in investment funding for TMD during FY 1995-99. This option would create a significant bow-wave problem in the period beyond the FYDP, due to the large number of systems acquired during the initial years.

Option 2: Core Program Plus Sea-Based Upper Tier. This option consists of the core TMD program plus the Sea-Based Upper Tier system and a less vigorous development effort for Corps SAM. Under this option, Corps SAM would not enter the demonstration/validation phase any earlier than FY 1998. About \$12 billion would be needed in FY 1995-99 to implement the option. Post-FYDP acquisition funding would increase modestly.

Option 3: Core Program and Technology Demonstration. This option would pursue the core TMD acquisition program plus a technology demonstration only for the Sea-Based Upper Tier. Depending on the success of the technology demonstration effort, the Sea-Based Upper Tier system could transition to an acquisition program in FY 1998. Alternatively, development of Corps SAM could be started at that time. The estimated FY 1995-99 cost of this option is about \$10 billion; no significant post-FYDP funding bow wave is projected.

Option 4: Core TMD program. This option consists of the core TMD program only, delaying the start of any additional acquisition program — Sea-Based Upper Tier or Corps SAM — until at least FY 1998. This option would require about \$9 billion in funding in FY 1995-99 and about the same level of expenditure in FY 2000-06.

National Missile Defense Options

In evaluating options for national missile defense, three main factors were considered: technological promise, responsiveness to the projected threat, and ABM treaty compliance. Various NMD architectures were examined, consisting of the Ground-Based Radar and the Ground-Based Interceptor, with and without Brilliant Eyes. In addition, four different development approaches were analyzed.

Option 1: Standard Acquisition Program. This option would cost approximately \$10 billion over the FYDP period. If started now, it could provide an initial operational capability by the year 2004. Pursuit of this type of NMD program might be appropriate if the likelihood that a potential adversary (e.g., Libya, Iraq, or North Korea) might acquire an intercontinental ballistic missile (ICBM) capability by 2004 was substantially higher than it currently appears to be.

Option 2: Systems Technology Demonstration Approach. This option would cost about \$7 billion over the FYDP period. It envisions conducting enough development to ensure that the United States — given the knowledge of an emerging threat and the decision to start development — would have the capability to deploy a prototype ground-based system within about five years and production-quality hardware in about eight years. Although this approach could save \$3 billion to \$4 billion during FY 1995-99 relative to the first option, the total expenditure for a single, fully configured site (with production equipment) would be considerably more than if a standard acquisition program were started now. The specific option considered would permit a prototype deployment by 2003 (given a decision in 1999 to do so), with the first production hardware available in 2007.

Option 3: NMD Technology Program Plus Brilliant Eyes. This option would cost \$3 billion over the FYDP years, including about \$200 million annually for acquisition of Brilliant Eyes. It preserves a capability in the key technologies being investigated for NMD. Under this approach, it would take 10 to 15 years to deploy an operationally effective system from

the time a decision was made to do so. Cost savings relative to Option 1 would be \$7 billion to \$8 billion during FY 1995-99. The NMD technology alternative would, in conjunction with TMD activities, preserve an adequate industrial base in critical technology areas.

Option 4: NMD Technology Program Without Brilliant Eyes Acquisition. This option would cost about \$2 billion over the FYDP period. It is similar to the third option, except that a Brilliant Eyes acquisition program is not included. Option 4 would provide cost savings (relative to Option 1) of \$8 billion to \$9 billion during the FYDP years.

The Decision

In considering the proper approach to ballistic missile defense, the Bottom-Up Review examined a range of program options that emphasized theater missile defense, national missile defense, both TMD and NMD, or neither. The options ranged in cost from \$15 billion to \$25 billion, although each would generate significant savings compared with the Bush Administration's planned \$39 billion expenditure on ballistic missile defense during FY 1995-99.

Given the nature of the present and projected threat from ballistic and cruise missiles armed with weapons of mass destruction, a decision was made to emphasize protection of forward-deployed U.S. forces in the near term and to proceed with a more robust TMD program, combined with a more limited NMD technology program.

On TMD, we have decided to pursue Option 2 — a TMD program that includes PAC-3, the Standard Missile Block IVA, THAAD, and the Sea-Based Upper Tier system, all funded as major acquisitions in FY 1995-99. We will also examine the feasibility of ascent/boost-phase intercept capabilities. Development of PAC-3 will allow major work on Corps SAM to be deferred until FY 1998.

On NMD, we will fund a technology program at approximately \$600 million per year as a hedge against

the emergence of a greater long-range missile threat than is now projected. This program, in conjunction with the recommended TMD option, will preserve an adequate technology base in critical ballistic missile defense areas.

Specifically, Brilliant Eyes, or an equally effective alternative, would continue as a technology program; ground-based radar technology would advance through the GBR program for THAAD; and existing interceptor technology efforts, including THAAD and LEAP (if selected for the Sea-Based Upper-Tier system), would provide a development path to a ground-based interceptor for NMD.

Overall, the ballistic missile defense program will require an investment of approximately \$18 billion over the FYDP period, with about two-thirds (or \$12 billion) of the total expenditure directed toward TMD. This will provide a savings of about \$21 billion compared with the previous Administration's BMD program.

We believe the recommended overall BMD program — a robust TMD effort plus a limited NMD technology program — is the best and most cost-effective approach. It is both consistent with our current understanding of the likelihood of a limited missile attack against the United States and provides the capabilities needed to defeat the more pressing theater ballistic and cruise missile threats.